REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Official Action dated December 29, 2003 and the Advisory Action Dated June 16, 2004. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1-5 are under consideration in this application. Claims 1 and 5 are being amended, as set forth in the above marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim applicants' invention.

Additional Amendments

The claims are being amended to correct formal errors and/or to better recite or describe the features of the present invention as claimed. All the amendments to the claims are supported by the specification. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Prior Art Rejection

Claim 1 remains rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,898,041 to Yamada et al. (hereinafter "Yamada") in view of U.S. Patent No. 5,771,084 to Morozumi (hereinafter "Morozumi"). Claims 2-5 remain rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada, in view of Morozumi, and in further view of Woods et al. U.S. Patent 4,668,713 to Woods et al. (hereinafter "Woods"). These rejections have been carefully considered, but are most respectfully traversed, as more fully discussed below.

The liquid crystal display device of the invention, as now recited in claim 1 (e.g., Fig. 1), comprises: a liquid crystal panel PNL in which a lower substrate SUB1 having thin film transistors for switching for pixel selection on its inside surface and an upper substrate SUB2 having color filters for plural colors on its inside surface are disposed in opposition to each other with a layer of a liquid crystal compound LC being interposed therebetween, and the lower substrate SUB1 and the upper substrate SUB2 are stuck to each other by a sealing material SL

which is arranged to surround a display area AR of the upper substrate SUB2 and has, in a portion, a cut which serves as a liquid crystal injecting port INJ, the liquid crystal injecting port INJ being sealed with an end-sealing material PLG cured by irradiation with ultraviolet rays in an accumulated light quantity of 4,000 mJ/cm^2 or more (p. 24, lines 8-15; Fig. 7) ***after*** a liquid crystal compound LC has been injected through the liquid crystal injecting port INJ. In particular, the amount of constituent components of the end-sealing material INJ$_1$ which elute (p. 24, line 12) into the liquid crystal compound LC at the vicinity of the liquid crystal injecting port INJ as impurities, is 1.0/10,000 or less of the total peak area value of the liquid crystal compound that is measured by gas chromatography/mass spectrometry.

The invention is also directed to a method of manufacturing a liquid crystal display device as recited in claim 1, comprising the steps of: sticking the upper substrate and the lower substrate to each other by a sealing material which is arranged to surround a display area of the upper substrate and has, in a portion, a cut which serves as a liquid crystal injecting port; applying an end-sealing material to the liquid crystal injecting port after the liquid crystal compound has been injected through the liquid crystal injecting port, the end-sealing material containing a reactive dilution monomer noted in Table 2, a photocrosslinked reaction initiator expressed by any of Chemical Formulae 4 and 5(i) to 5(vi) and a phenolic antioxidant expressed by any of Chemical Formulae 6(i) to 6(iii); and curing the end-sealing material by irradiation with ultraviolet rays in an accumulated light quantity of 4,000 mJ/cm^2 or more and heating and aging the cured end-sealing material:

Applicants respectfully submit that none of the cited prior art references discloses, teaches or suggests "such a liquid crystal injecting port INJ being sealed with an end-sealing material PLG cured by irradiation with ultraviolet rays in an accumulated light quantity of 4,000 mJ/cm^2 or more ***after*** a liquid crystal compound LC has been injected through the liquid crystal injecting port INJ" thereby reducing "the amount of constituent components of the end-sealing material INJ$_1$ which elute into the liquid crystal compound LC at the vicinity of the liquid crystal injecting port INJ as impurities, to 1.0/10,000 or less of the total peak area value of the liquid crystal compound that is measured by gas chromatography/mass spectrometry" according to the invention.

The Example 1 and Example 3 of Yamada (applying LC injection method) were relied upon by the Examiner to teach "curing an end-sealing material by UV irradiation with ultraviolet rays in an accumulated light quantity of 4,000 mJ/cm^2 or more after a liquid crystal

compound LC has been injected through the liquid crystal injecting port." However, Yamada only (1) temporarily cures a sealing material 3 by UV irradiation (col. 11, lines 6-7, 13-14), (2) main hardens the seal material 3 by thermosetting curing (col. 11, lines 8-10, 16-17), (3) cuts the doubled-cured seal material to form an opening 9 (col. 11, line 18), (4) fills liquid crystal into the cell via the opening 9 (col. 11, line 20), and then (5) closes the opening 9 (col. 11, line 21).

First of all, Yamada merely cures the sealing material 3 (but not an end-sealing material in a liquid crystal injecting port) by UV irradiation. Yamada simply fails to provide any details for "closing" the opening 9 (col. 11, line 21). It is possible that Yamada just glues back the cut-off section of the doubled-cured seal material 3, rather curing an end-sealing material in the opening 9. Applicants point out that a rejection based on hindsight knowledge of the invention at issue is improper.

Secondly, Yamada cures the sealing material 3 by UV irradiation ***before*** (rather than ***after***) injecting a liquid crystal compound through the opening to provide "*a good straight finishing without discharge or cutoff of the seal material .., as illustrated in FIG. 4* (col. 11, lines 14-15)". On the other hand, the invention cures an end-sealing material in a liquid crystal injecting port INJ by UV irradiation ***after*** injecting a liquid crystal compound LC therein to reduce the amount of constituent components of the end-sealing material INJ eluding into the liquid crystal compound LC at the vicinity of the liquid crystal injecting port INJ as impurities. It is well established that a rejection based on principles that teach away from the invention is improper.

Thirdly, Yamada temporarily cures the sealing material 3 (rather than "an end-sealing material in a liquid crystal injecting port) by UV irradiation at 4,800 mJ. As such, Yamada fails to teach or suggest curing an end-sealing material by UV irradiation in an accumulated light quantity of 4,000 mJ/cm^2 or more.

Although the invention applies the general UV curing mechanism as disclosed in Yamada or Japanese Patent Publication No. 13666/1976 (p. 5, lines 17-18, hereinafter "JP'976"), the invention applies the mechanism on an end-sealing material in a liquid crystal injecting port in an accumulated light quantity of 4,000 mJ/cm^2 or more to achieve unexpected results or properties. For example, the amount of constituent components of the end-sealing material INJ, which elute into the liquid crystal compound LC at the vicinity of the liquid crystal injecting port INJ as impurities, is reduced to 1.0/10,000 or less of the total peak area value of the liquid

crystal compound that is measured by gas chromatography/mass spectrometry. "In this manner, it is possible to restrain the occurrence of display irregularity in the vicinity of the end-sealing material and provide image display of high quality (p. 24, lines16-18)." On the other hand, the total concentration of the end-sealing material components in the vicinity of the liquid crystal injecting port of JP'976 is 1.5/10,000 or more with respect to the entire liquid crystal peak area (p. 6, lines 2-10). The presence of these unexpected properties is evidence of nonobviousness. MPEP§716.02(a).

> "*Presence of a property not possessed by the prior art is evidence of nonobviousness. In re Papesch, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) (rejection of claims to compound structurally similar to the prior art compound was reversed because claimed compound unexpectedly possessed anti-inflammatory properties not possessed by the prior art compound); Ex parte Thumm, 132 USPQ 66 (Bd. App. 1961) (Appellant showed that the claimed range of ethylene diamine was effective for the purpose of producing " 'regenerated cellulose consisting substantially entirely of skin' " whereas the prior art warned "this compound has 'practically no effect.' ").*

Although "[t]*he submission of evidence that a new product possesses unexpected properties does not necessarily require a conclusion that the claimed invention is nonobvious. In re Payne, 606 F.2d 303, 203 USPQ 245 (CCPA 1979). See the discussion of latent properties and additional advantages in MPEP § 2145*," the above-mentioned unexpected properties were unknown and non-inherent functions in view of JP'976 or Yamada, since JP'976 and Yamada do not inherently achieve the same results. In other words, these advantages would not flow naturally from following the teachings of JP'976 and Yamada, since JP'976 and Yamada fail to suggest "curing an end-sealing material in a liquid crystal injecting port in an accumulated light quantity of 4,000 mJ/cm^2 or more ***after*** a liquid crystal compound LC has been injected through the liquid crystal injecting port"

Applicants further contend that the mere fact that one of skill in the art could rearrange the process of JP'976 or Yamada to meet the terms of the claims is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for one skilled in the art to provide the unexpected properties, such as reducing the amount of constituent components of the end-sealing material, which elute into the liquid crystal

compound LC at the vicinity of the liquid crystal injecting port as impurities, to 1.0/10,000 or less of the total peak area value of the liquid crystal compound that is measured by gas chromatography/mass spectrometry", without the benefit of appellant's specification, to make the necessary changes in the reference device. *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984). MPEP§2144.04 VI C.

As point out in the specification (p. 6, 2nd full paragraph), no consideration has yet been given by the prior art to countermeasures against such a display irregularity occurring in the vicinity of the liquid crystal injecting port INJ. In addition, the measurement equipment recited in the claim, i.e., "gas chromatography/mass spectrometer" and one page 21, 5th to the last line, was made available by the assignee Hitachi Ltd. in 1997 such that it is was not available as of the Japanese filing date of Yamada (March 1, 1995). Before "gas chromatography/mass spectrometer", conventional gas chromatography was commonly used. The precision of "gas chromatography/mass spectrometer" is 100 times higher than that of the conventional gas chromatography. Applicants contend that one skilled in the art would not be motivated by Yamada to measure or try to reduce constituent components of an end-sealing material as impurities in a liquid crystal injecting port since no proper measuring tool was available then.

One skilled in the art would not be motivated to combine Yamada with JP'976 since their conflict teaching of the timing of UV curing. Yamada cures the sealing material 3 by UV irradiation ***before*** injecting a liquid crystal compound through the opening. On the other hand, JP'976 cures an end-sealing material in a liquid crystal injecting port INJ by UV irradiation ***after*** injecting a liquid crystal compound LC. It is well established that a rejection based on principles that teach away from the invention is improper. It is well established that a rejection based on cited references having contradictory principles is also improper.

Woods was relied upon by the Examiner to teach a free radical stabiliser or inhibitor (~phenolic antioxidant). However, Woods fails to compensate for the above-mentioned deficiencies.

In addition, Applicants contend that one skilled in the art of liquid crystal display panels would not be motivated to include Woods' free radical stabiliser or inhibitor (~phenolic antioxidant) in a coating protective film into Yamada's liquid crystal panel sealing material, since (1) Woods' coating film is applied to printed circuit boards and electronic components thereof (e.g. conductors), rather than any liquid crystal display panels of the invention or Yamada; (2) sunlight causing premature offset of curing the sealing material in Woods is not

a concern for liquid crystal panels of the invention; (3) Woods' coating film is applied against ***external contamination***, e.g., moisture, humidity, various chemicals which may be residues of the manufacturing process such as fluxes, organic solvents, release agents, metal particles and marking inks, and contaminants which inadvertently may be deposited by human handling such as body greases, fingerprints, cosmetics and food stains, salt spray, dirt and dust, oil, fuel, acid, corrosive vapour and fungus (col. 1, lines 11-32), rather than any ***internal impurities*** that inevitably elute into the liquid crystal compound at the vicinity of the liquid crystal injecting port as addressed by the invention; and (4) Woods focuses on a coating protective film such that the term "sealants" was loosely mentioned once.

Applicants contend that neither JP'976, nor Yamada, nor their combination with Woods teaches or discloses each and every feature of the present invention as disclosed in independent claims 1 and 4. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicants respectfully contend that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of

the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

Respectfully submitted,

Stanley P. Fisher
Registration Number 24,344

Juan Carlos A. Marquez
Registration Number 34,072

REED SMITH LLP
3110 Fairview Park Drive, Suite 1400
Falls Church, Virginia 22042
(703) 641-4200

June 24, 2004

SPF/JCM/JT

Substitute Abstract of the Disclosure

A write operation of a MRAM in which a current necessary for inverting magnetization of an MTJ element has to be passed through a data line and therefore current consumption is large. The write operation comprises: comparing input data DI with read data GO read from a memory cell array and encoding the input data DI to form write data GI by a data encoder WC; and decoding the read data GO by a data decoder RD to form output data DO. In a nonvolatile semiconductor memory in which the current is passed through the data line to write data into a memory cell, the number of bits to be written during the write operation is reduced, and the current consumption can be reduced. This can realize the MRAM including a low-power highly-integrated memory.